

Date: Friday, 3/9/2007 10:30:03 AM  
 User: Kim Johnston

31916

## Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : X-TUBE 412  
 Job Number : 31139  
 Estimate Number : 12783  
 P.O. Number : N/A  
 This Issue : 3/9/2007 S.O. No. : N/A  
 Prsht Rev. : NC  
 First Issue : N/A Type : LANDING GEAR  
 Previous Run : 31138  
 Part Number : D412664145  
 Drawing Number : D412-664-245 U/R  
 Project Number : N/A  
 Drawing Revision : U/R  
 Material : N/A  
 Due Date : 4/6/2007 Qty: 1 Um: Each  
 Written By :  
 Checked & Approved By :  
 Comment : Est Revis New Issue 07-02-14 JLM



## Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: Photocopy bluefile & type labels per PPPD412-664-105 CHG 001

2.0 D6019128 Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6019-128 Crosstube 29369

Check OD = 2.7500"; ID =

RG 07.03.12

①

3.0 MORI SEIKI MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

Turn as per Dwg D412-664-145

RG 07.03.12

①

4.0 QC2 INSPECT PARTS AS THEY COME OFF MACHINE



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

RG 07.03.12

①

5.0 QC8 SECOND CHECK



Comment: SECOND CHECK

SD 01.03.12

①

6.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Polish entire outside surface of crosstube

DP 7-3-13

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 3/9/2007 10:30:03 AM  
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31139

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

BF 07-03-13

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

JB 7-4-4

9.0

QC3/5

INSPECT WORK/WING WALK



Comment: Inspect work & Chemical conversion Coat

DP 7-4-4

10.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-145 using CNC bender program

EL 07-04-04

11.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

JA 04-11

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

} RT 07-04-12

JB 7-4-12

13.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube as per QSI 005 4.1

JB 7-4-12

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

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## Process Sheet

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Drawing Name: X-TUBE 412

Job Number: 31139

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

14.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



*20704-13 ①*



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

15.0

QC5

INSPECT WORK TO CURRENT STEP



*20704-13 ①*



Comment: INSPECT WORK TO CURRENT STEP

*LPI*

16.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: *3546* LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

*20704-13 ①*

17.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

*20704-17 ①*

18.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

19.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

*20704-19 ①*

20.0

QC14

Inspect Spray Paint



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

*20704-19 ①*

*①*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
07.04.20	26	MS21920-24 CLAMPS DON'T FIT (TOO SMALL)	UP 07.04.20 P.V. QSI 042	USE MS21920-25 REF DS EMAIL			UP 07.04.20 P.V. QSI 042	07.04.20

NOTE: Date & initial all entries

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Drawing Name: X-TUBE 412

Job Number: 31139

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

21.0

D31893

Chafing Shield



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Chafing Shield

Batch: 31959

RT 07-04-19

22.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0798 sf(s)/Unit Total : 0.0798 sf(s)

Rubber Cushion

Cut to .630" X 4.4" X 4 PCS

Batch: 31948

RT 07-04-19

23.0

D28931

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2893-1

Support

29073

RT 07-04-19

24.0

D285600

Abrasion Strip



Comment: Qty.: 0.9450 f(s)/Unit Total : 0.9450 f(s)

Abrasion Strip

1X D2856 .250" X 8.42"

Batch: 29850

RT 07-04-19

25.0

MS2192022

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 MS21920-24

Clamp

102389

102932

RT 07-04-19

26.0

MS21920-25

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch: 102932

103897

RT 07-04-19

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries



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Drawing Name: X-TUBE 412

Job Number: 31139

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1  
Assemble as per Dwg D412-664-145

Install Chaffing Shield

Instal supports with magnobond 6398 per dwg D412-664-245,  
cure for 12hrs before packaging.

Time & date of application:

6:00pm 07-04-19

Batch: 6 M107628

RT  
07-04-19

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

07-04-20

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1  
Identify and pack for shipping as per PPP D412-664-105

\*\*\*\*\*Ensure tube is not packaged if curing time is less than 12 hrs, see step 26 for application time & date  
\*\*\*\*\*

Time & date of packaging:

Location:

PPP Rev:

PACKAGED  
with  
B.31916

### POSITIVE RECALL

EFFECTIVE 07.03.09 AUTH UP

RELEASED UP DATE 07.04.20

30.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

07-10-20 ①

Job Completion



U 07-10-20

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



DESIGN <i>qp</i>	DRAWN BY <i>qp</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>#</i>	APPROVED <i>#</i>	DRAWING NO. D412-664-145	REV. B SHEET 1 OF 3
DATE 07.03.01		TITLE CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	NEW ISSUE	
B	07.03.01	CHG RUBBER CUSHION	

# PRELIMINARY ISSUE

## PARTS LIST:

Qty	Part Number	Description
X	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-440	RUBBER CUSHION
2	MS21920-22	CLAMP
4	MS21920-24	CLAMP
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

## GENERAL NOTES:

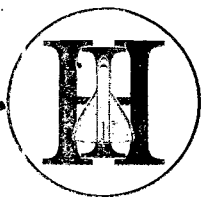
- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6019-128  
FINISHED LENGTH =  $124.48 \pm 0.020$  (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR MS21920-22 CLAMPS AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-24 CLAMPS WITH D3595-063-440 RUBBER CUSHIONS TO SECURE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.

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NO. 31139

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# HeathAir

INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3  
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 36169

A.M.O. Number: 46/90

## NON-DESTRUCTIVE TESTING REPORT

### AIRCRAFT / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

### INSPECTION REQUIREMENTS

Carry out FPI of five (5) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty. (1) P/N D412-664-245 S/N B31437  
Qty. (2) P/N D412-664-145 S/N's B31435 & B31139  
Qty. (2) P/N D412-664-201 S/N's B29531 & B29506

☐ RADIOGRAPHY

☐ ULTRASONIC

☒ PENETRANT

☐ MAGNETIC PARTICLE

☐ EDDY CURRENT

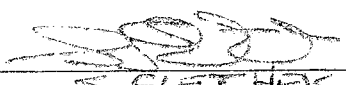
### INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on five (5) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)  
Ardrox 970P25E Batch #04B503.

Five (5) cross tubes PASSED inspection.

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH  
THE APPLICABLE STANDARDS OF AIRWORTHINESS

INSPECTED BY:   
S. FLECHER

DATE April 16, 2007

INSPECTION  
STAMP(S) Not Required

### CUSTOMER INFORMATION

CUSTOMER: Dart Aerospace

P.O. NUMBER

3546

ADDRESS:

CONTACT NAME:

LABOUR @  
MATERIALS @  
TRAVEL EXPENSES @  
HOTEL EXPENSES @

\$

GST

PST

INVOICE NO.

TOTAL \$

WHITE COPY - INSPECTION FILE • YELLOW COPY - CUSTOMER • PINK COPY - ACCOUNTANT

## Chris Provencal

---

**From:** David Shepherd [dshepherd@dartaero.com]  
**Sent:** April 20, 2007 10:58 AM  
**To:** 'Chris Provencal'  
**Subject:** RE: NCR D412-664-145

As we discussed this morning, it is acceptable to use the MS21920-25 clamp.

David

---

**From:** Chris Provencal [mailto:cprovencal@dartaero.com]  
**Sent:** Friday, April 20, 2007 7:01 AM  
**To:** David Shepherd (David Shepherd)  
**Subject:** NCR D412-664-145

David,

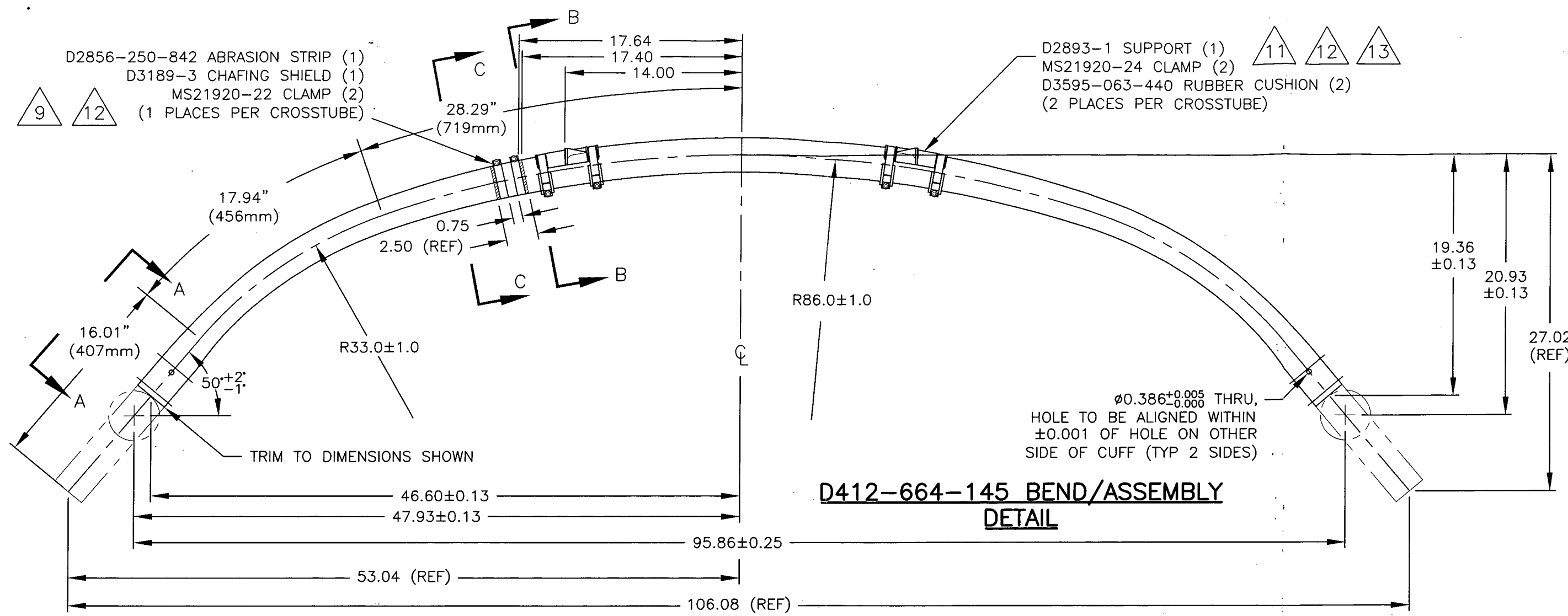
For the D412-664-145 crosstube. The MS21920-24 clamps do not fit properly and they want to use a -25 (we don't have any -26 in stock). It looks like it should work after clamped, but they can't get the clamp on to start. The calculations show they should work, not sure how the others managed to work. I checked a clamp, the spec says it should be OK to 3.00" (we need 3.00"), but when I fasten a -24 clamp with 2 threads showing, I'm measuring approximately 2.90".

Is it acceptable to use a MS21920-25 clamp?

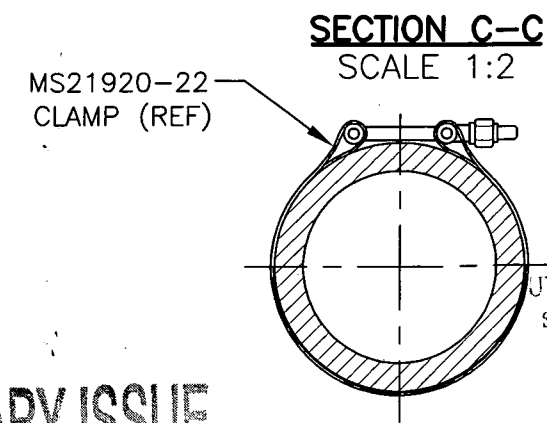
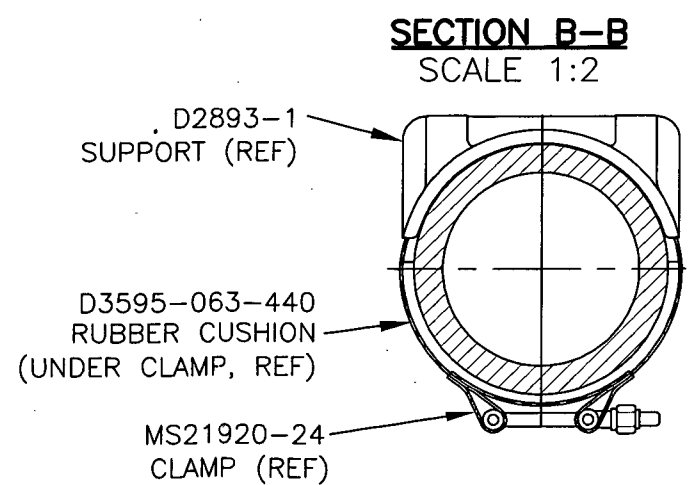
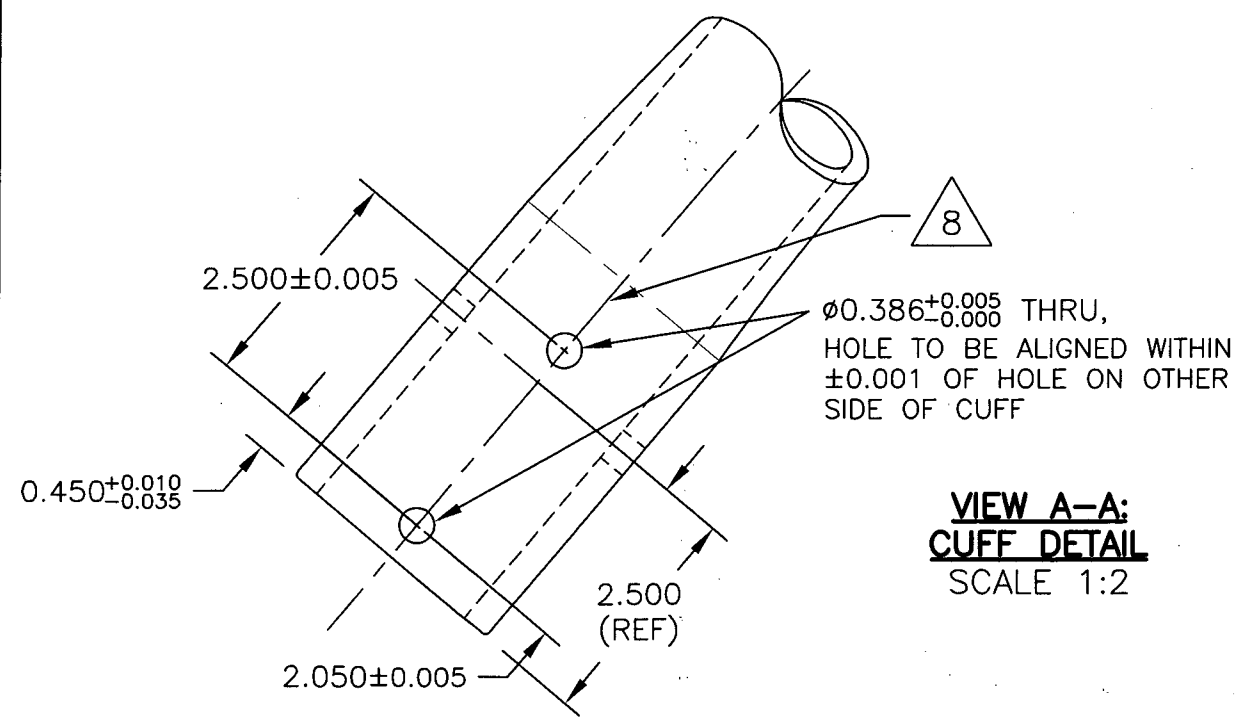
-Chris

--  
No virus found in this incoming message.  
Checked by AVG Free Edition.  
Version: 7.5.446 / Virus Database: 269.5.4/768 - Release Date: 4/19/2007 5:32 AM

--  
No virus found in this outgoing message.  
Checked by AVG Free Edition.  
Version: 7.5.446 / Virus Database: 269.5.4/768 - Release Date: 4/19/2007 5:32 AM



**D412-664-145 BEND/ASSEMBLY  
DETAIL**



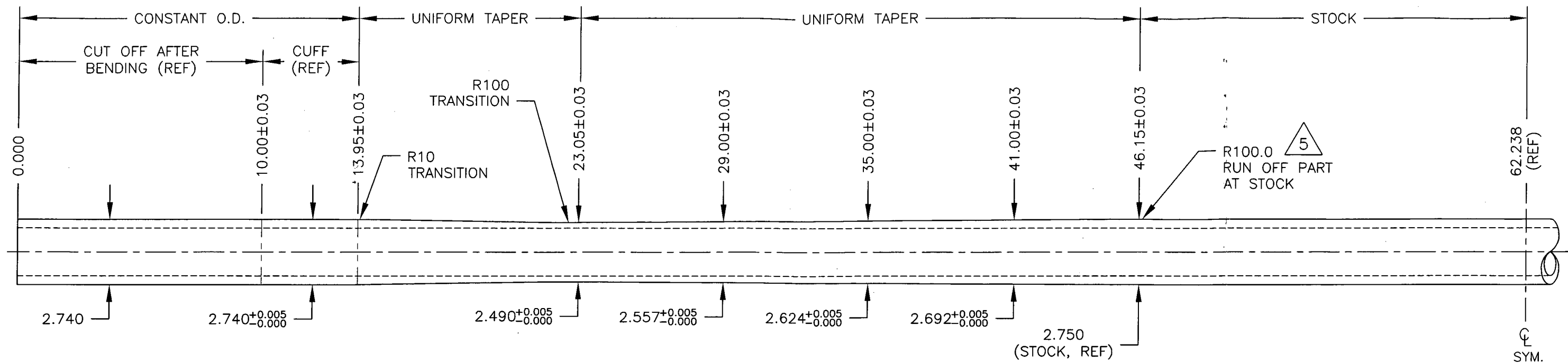
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DATE 07.03.01		TITLE CROSSTUBE (412 LOW-NARROW FWD)		SCALE 1:8	







# **D412-664-145 MACHINING DETAIL**

**PRELIMINARY ISSUE**

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DATE 07.03.01		TITLE CROSSTUBE (412 LOW-NARROW FWD)		SCALE 1:4	

